

## **REMARKS**

By the present amendment, claims 26 to 33, 35, 37, 38 and 41 to 43 are pending in the application. Claims 26, 27, 37 and 38 are independent claims.

### **Support for Claim Amendments**

Claims 26, 27, 37 and 38 have been amended to recite water sufficient to solublize alkali salts, wherein the leaching of zinc compounds is minimized. Support may be found in the specification as filed, for example, at page 22, lines 8-21.

Claims 37 and 38 have been amended to recite a secondary dust enriched in zinc. Support may be found in the specification as filed, for example, at page 47, lines 23-26

### **§103**

A.) Claims 26 to 33, 35, and 43 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over U.S. Patent No. 5,942,198 to Myerson et al. in view of U.S. Patent No. 5,851,490 to Myerson et al. and further in view of U.S. Patent No. 6,755,888 to Ibaraki et al. and U.S. Patent No. 6,648,942 to Hoffman et al.

B.). Claims 37, 38, 41, and 42 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over U.S. Patent No. 6,775,888 to Ibaraki et al. in view of U.S. Patent No. 6,368,379 to Tateishi et al. and further in view of U.S. Patent No. 5,942,198 to Myerson et al.

These rejections are respectfully traversed.

## **Patentability**

### **Part A**

The Examiner has applied Myerson et al. '198 as allegedly teaching all of the claim features of independent claims 26 and 27, except for the following elements, which can allegedly be found in the prior art at the cited locations:

- I. A slurry having pH 7 to 11.5. See, Office Action pages 3 and 4 citing Myerson '198, at column 16, lines 12-17 and Myerson '490.
- II. The alkali /(zinc + lead) ratio of at least 0.1. See, Office Action, page 3 citing Myerson '198 at Table 1.
- III. Dehydrated material charged to a rotary reduction furnace. See, Office Action, page 5 citing Ibaraki, at column 5, lines 49-51.
- IV. An exhaust gas treatment facility having at least one of a waste heat boiler and an air preheater. See, Office Action, page 5 citing Hoffman, at column 7, lines 26-31.

In contrast to the Examiner's contentions, the combination of Myerson et al. '198 with Myerson et al. '490 in further view of Ibaraki and Hoffman does not disclose or suggest the step of mixing said feed material with water to produce a slurry having a pH of 7 to 11.5, whereby the claimed method of reducing the buildup of alkali metal compounds of oxygen or halogens during the reduction of metal oxides in a rotary hearth type furnace results in the production of a secondary dust rich in zinc. Thus, applicants respectfully traverse the rejection for at least that reason that a *prima facie* case of obviousness has not been established.

The pending independent claims 26 and 27, from which claims 28 to 33, 35 and 43 depend, are directed to a method of preventing inorganic zinc, lead, or alkali metal compounds of oxygen or halogens, or mixtures thereof, from depositing inside the exhaust

gas treatment system of a rotary hearth type reduction furnace. See, specification as filed, e.g., page 29, line 35 through page 30, line 2. The method is particularly useful when at least one component of a feed material has a significant amount of water soluble alkali salts, iron oxides, and zinc oxides or lead oxides, or mixtures of both, in a molar ratio of alkali/(zinc + lead) of at least 0.1. See, Id., e.g., page 20, lines 5-11. The method includes the step of washing at least the component of the feed material having the highest amount of alkali salts with a minimal amount of water sufficient to solublize the water soluble alkali salts, but not so much as to result in leaching the zinc and lead components into solution. See, Id., e.g., page 22, lines 8-16. The resulting solid mass is then isolated, dehydrated, and charged into a rotary reduction furnace. See, Id., e.g., page 23, lines 12-18. The rotary reduction furnace of the invention is equipped with an exhaust gas treatment facility, and at least one of a waste boiler and an air preheater. See, Id., e.g., page 12, lines 15-20. The claimed method produces a secondary dust enriched in zinc and lead, i.e., markedly reduced in alkali salt and iron oxide content; recovering the secondary dust produced by the present inventive method provides an excellent feedstock for industrial processes which concentrate and recover zinc or lead. See, Id., e.g., page 47, lines 23-26.

Myerson et al. '198 describes a process for isolating zinc oxide using an ammonium chloride leach and for producing a briquette from undissolved iron and carbon compounds. See, e.g., column 1, lines 24-31. The Myerson et al. '198 method is achieved by "treating the waste material with an ammonium chloride solution at an elevated temperature to form a product solution which comprises dissolved zinc and dissolved zinc oxide whereby any iron oxide in the waste material will not go into solution." See, e.g., column 12, lines 38-42 and Examples 1-17, column 16-33. Furthermore, "[d]uring the leaching process of the ['198 method], 95-100% of the zinc present as zinc oxide is extracted." See, e.g., column 4, lines 6-8.

Myerson et al. '490 discloses controlling the pH in order to extract and then precipitate zinc oxide from a waste materials stream comprising zinc compounds and/or iron compounds. See, e.g., Abstract. "Leaching these waste material streams and/or fumes in an ammonium chloride solution may result in a product solution with a low pH (less than about 6.3)." See, e.g., column 3, lines 11-13. "Preferably, the pH of the product solution is kept

low by the addition of a suitable acid until the product solution reaches the crystallizer." See, e.g., column 3, lines 24-26. After the solids have been removed from solution, the '490 method discloses the narrow range of a pH of about 6.5 to about 7.0 in conjunction with a cooling step in order to recover zinc from the leach solution. See, e.g., column 4, lines 65-67 and column 3, lines 27-30.

Thus, little to no zinc remains in the iron oxide and carbon briquettes of the '198 or the '490 methods. In contrast, the dehydrated material of the present invention is enriched in zinc and/or lead compounds and after reduction in a rotary hearth type furnace provides a secondary dust rich in zinc or lead or both.

Furthermore, in contrast to the Examiner's contention at page 6 of the Office Action, a temperature of 80 °C or less (claim 30) is in fact substantially different than a temperature range of 90 °C or greater because one skilled in the art would have expected the different temperatures to have substantially different leaching properties. For example, Table II of Meyerson et al. '198 and Table III of Meyerson et al. '490 shows a drastic decrease in the solubility of ZnO at temperatures of 80 °C or less. Therefore, temperatures of greater than 90 °C are in fact crucial for the Meyerson method since temperatures of 80 °C or less would not properly dissolve the zinc complexes required by the Meyerson method.

Therefore, the combination of Myerson '198 and Myerson '490, which teach leaching zinc from the iron oxide solids, do not teach or suggest the presently claimed

method which requires that zinc remain in the solid state and is not leached into solution. The disclosures of Ibaraki et al. and Hoffman et al. do not remedy the deficiencies of the Myerson references. Thus, for at least this reason, a *prima facie* case of obviousness has not been established. Applicant's respectfully request reconsideration and withdrawal of the rejection to claims 26 to 33, 35 and 43 under 35 U.S.C. §103.

## **Part B**

The Examiner has applied Ibaraki as allegedly teaching all of the claim features of independent claims 37 and 38, from which claims 41 and 42 depend, except for the following elements, which can allegedly be found in the prior art at the cited locations:

- I. A slurry of steel making waste and a pH adjuster. See, Office Action pages 8 and 9 citing Myerson '198, at column 16, lines 12-17.
- II. The pH adjuster is fly ash. See, Office Action, page 8 citing Myerson '198, at column 6, line 58.
- III. An exhaust gas from the rotary hearth is zinc oxide. See, Office Action, page 8 citing Tateishi at column 6, lines 22-26.

In contrast to the Examiner's contentions, the combination of Ibaraki and Myerson et al. '198 in further view of Tateishi does not disclose or suggest a method enabling the production of a secondary dust rich in zinc oxide. Thus, applicants respectfully traverse the rejection for at least that reason that a *prima facie* case of obviousness has not been established.

Myerson '198 has been applied as teaching the pH adjuster as recited in independent claims 37 and 38. Myerson '198 is as characterized above. Myerson discloses extreme acidic or alkaline conditions to enable the complete extraction of zinc into a leach solution. The isolated iron oxide containing solid mass of the Myerson '198 disclosure is

essentially devoid of zinc. In contrast, the present method produces a dehydrated material enriched in zinc that produces secondary dust containing zinc oxide.

Therefore, the combination of Ibaraki and Tateishi and Myerson '198 do not render the claimed method obvious. Myerson '198, which discloses leaching zinc from the iron oxide solids, does not teach or suggest the presently claimed method which requires that

zinc remain in the solid state and is not leached into solution. The disclosures of Ibaraki and Tateishi do not remedy the deficiencies of the Myerson references. Thus, for at least this reason, a *prima facie* case of obviousness has not been established. Applicant's respectfully request reconsideration and withdrawal of the rejection to claims 36, 37, 41 and 42 under 35 U.S.C. §103.

### **Summary**

It is therefore submitted that amended independent claims 26, 27, 37 and 38, and all claims dependent thereon, are patentable.

**CONCLUSION**

It is submitted that in view of the present amendment and the foregoing remarks, the application is now in condition for allowance. It is therefore respectfully requested that the application, as amended, be allowed and passed for issue.

Respectfully submitted,

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